CLAIMS

1. A method for identifying elements associated with a target molecule comprising the steps of:

(a) providing a probe capable of binding by specific molecular interaction to a predetermined specifically defined region of a target molecule, the probe associated with or capable of recruiting an enzyme;

(b) adding a tag capable of being activated by the enzyme such that it can attach to elements in the vicinity of the enzyme; and

(c) isolating elements having the tag attached thereto,

wherein the defined region occurs once, twice, or in a low number of copies in the target molecule.

2. A method according to claim 1 wherein the tag can attach only to elements in the vicinity of the enzyme.

3. A method according to claim 1 or 2 wherein the low copy number of the defined region of the target molecule is selected from the group of integral numbers of more than 2 up to 1000.

4. A method according to claim 1, 2 or 3 in which the target molecule is selected from the group consisting of RNA molecules, and DNA molecules.

5. A method according to claim 1,2 or 3 in which the target molecule is selected from the group consisting of proteins or peptides, lipids, or other, artificial compounds.

6. A method according claim 1 or 2 in which the elements which may be associated with the target molecule include distant regulatory elements, RNA, DNA, proteins and protein complexes, transcription factors, or in-vivo ligands of a specific receptor.

7. A method according to claim 4 in which the probe is selected from the group consisting of DNA probe, and an RNA probe.

8. A method according to claim 5 in which the probe is selected from the group consisting of an antibody specific for a protein, lipid or other molecule.

9. A method according to any preceding claim in which the probe is associated with the enzyme through an antibody/enzyme conjugate, or enzyme/target molecule fusion.

10. The method according to any preceding claim in which the enzyme is targeted using a hapten labelled probe and then a hapten-specific Fab fragment/enzyme conjugate is added.

11. The method according to any of claims 1 to 4 and 10 in which the enzyme is targeted to RNA using a hapten-labelled probe specific to the RNA of an intron of an active gene, and then a hapten-specific Fab fragment/enzyme conjugate is added.

12. The method according to claim 10 or 11 in which the hapten is dioxygenin, biotin, dinitrophenol or FITC.

13. The method according to any preceding claim in which the enzyme is Horse Radish Peroxidase and the tag is biotin-tyramide.

14. The method according to any preceding claim in which elements are isolated using affinity chromatography or ImmunoPrecipitation.

15. A method for identifying elements of chromatin associated with transcribing RNA comprising the steps of:

(a) providing a hapten-labelled probe capable of binding by specific molecular interaction to a predetermined specifically defined region of RNA of a gene,

(b) providing an antibody conjugated with the enzyme horse-radish peroxidase, the antibody being specific for the hapten;

(c) adding biotin-tyramide by such that it can attach to elements in the vicinity of the enzyme;

(d)disrupting the chromatin

(e) isolating elements of chromatin having biotin attached thereto using affinity chromatography and purifying the elements.

16. The method according to claim 15 wherein in step (c) the tag can attach only to elements in the vicinity of the enzyme.

17. The method of claim 15 or 16 in which the chromatin is disrupted using sonication, enzymatic cleaving, or shearing with a French Press or small bore syringe.

18. The method according to any of claims 15 to 17 in which the hapten is digoxygenin.

19. Elements isolated by the method of any preceding claim.

20. A method for identifying DNA associated with a target molecule comprising the steps of:

(a) providing a probe capable of binding by specific molecular interaction to a predetermined specifically defined region of a target molecule, the probe associated with an DNA Adenine Methyltransferase;

(b) adding a restriction enzyme that will cut only DNA specifically methylated by DAM;

(c) isolating DNA cut by the restriction enzyme

(d) identifying the isolated DNA.

21. The method according to claim 20 wherein the isolated DNA is analysed/identified using Quantitative Real-Time PCR, slot blot or microarray.

 





22. A method for conducting a drug discovery business, comprising:
(i) by the method of any preceding claim, identifying DNA and/or protein associated with regulating gene expression;
(ii) generating a drug screening assay for identifying agents which inhibit or potentiate regulation of gene expression by the DNA and/or protein identified in step (i);
(iii) conducting animal toxicity profiles on an agent identified in step (ii), or an analogue thereof;
(iv) manufacturing a pharmaceutical preparation of an agent having a suitable animal toxicity profile; and
(v) marketing the pharmaceutical preparation to healthcare providers.

23. A method for conducting a bioinformatics business, comprising:
(i) by the method of any of claims 1 to 21, identifying DNA and/or protein associated with a gene at a chromosome location under a given condition; and repeating step (i); thereby
(ii) generating a database comprising information identifying different DNA and/or protein associated with one or more genes under one or more conditions.